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DIRECTIONS

FOR USING

BOTTUM'S

PATENT IMPROVED UNIVERSAL

LATHE CHUCKS

AND

IMPROVED LATHES,

FOR TURNING AND FINISHING EVERY DESCRIPTION OF

WATCH PIVOTS, PINIONS, STAFFS, &c.

ALSO

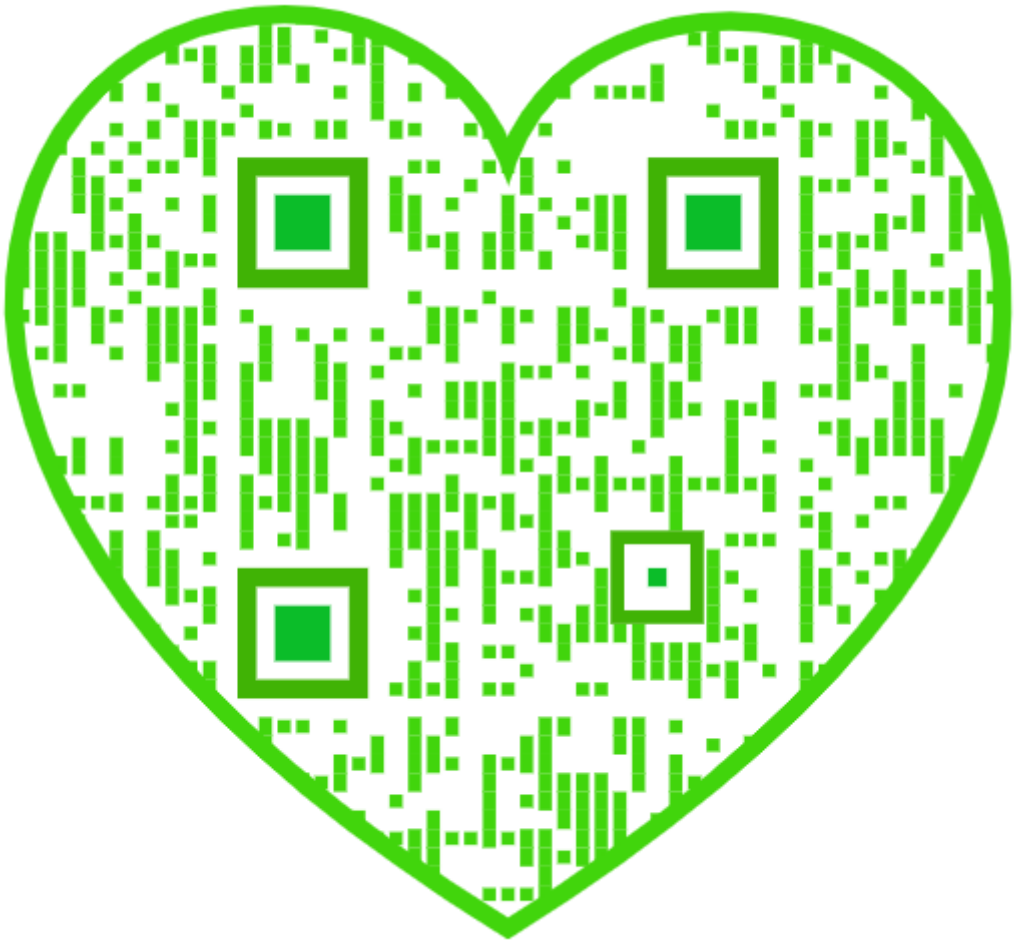
FOR TURNING AND FINISHING EVERY DESCRIPTION OF WORK CONNECTED WITH

THE WATCH MOVEMENT.

PATENTED JULY 15TH, 1851.

NEW YORK:
PRINTED BY HART & HOLDEN, 16 JOHN STREET.
1852.

Ex.
Presented by Charles Miller
Dis. N.Y. Aug. 24, 1852



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Entered according to Act of Congress, in the year 1852, by JAMES M. BOTTUM, in the Clerk's Office of the District Court for the Southern District of New York.

PREFACE.

THE following pages are not as complete in all respects as could be desired, yet they are believed to contain every thing necessary for the practical workman, for whose use they are chiefly designed.

Before the improvements here introduced, the foot Lathe had always been regarded as an article of little value to Watchmakers, in the construction of the more delicate parts of a Watch. In its improved form, it is believed to be more justly entitled to the appellation of "*Universal Lathe*" than any other now in use. Every variety of work, of the most delicate kinds, can be more safely and rapidly made, and at the same time equaling any thing produced by either makers or finishers in the ordinary way. The advantages to be derived from its use by those who are engaged in Watch Repairing, will greatly enhance its value, and will be duly appreciated by every candid person at all acquainted with the business.

May, 1852.

DIRECTIONS

Figure 1.

Figure 1 is a side view of the Improved Universal Lathe, designed more particularly for watchmakers' use. It is so constructed as to run with the least possible friction, and at the same time with great steadiness of motion; the parts cannot be easily worn from their adjustments, and with ordinary care it may be used for years for turning the most delicate pieces, without requiring any material alteration or repairs. For fitting up the Lathe, a strongly twisted cotton band should be used on the wheel, sufficiently large to fill the groove in the wood on the mandril; the ends should lap a little, and be well sewed together; the band should draw but lightly on the wheel, especially when the finer parts of a watch are to be turned and finished.

A is a Chuck, as shown in Figs. 3 and 4; C the cement; *c* and *d* the staff, with a pivot as cemented on the Chuck.

Figure 2.

Fig. 2 shows the method of securing a centre wheel and pinion, or any other long piece, where it may be inconve-

nient to use much cement. The Chuck A is to be carefully turned and centred at *a*, as shown in the figure; the hollow tube *b* should be made to slide freely on the Chuck A; C C are the parts where the cement is to be used. When a wheel is to be fastened, the cement should be softened at C C, and the hollow tube B moved gently to the left, until the pinion arbor meets the centre of the Chuck at A. The Lathe-mandril should then be slowly turned, and a piece of watch-wood held against the pivot at *a*, until the cement is hard.

A centre wheel and pinion may be secured in this manner for a new pivot, or for finishing the hollow, or facing the pinion, or making any required alteration in the wheel.

Figures 3 & 4.

Figs. 3 and 4 are Chucks, used for centring, turning and finishing pinions. In Fig. 3, *d* is the pivot, *b* the wheel, *c* the pinion, *a* the centre of the Chuck, and C the cement. Fig. 4 shows the pinion *c* and the pivot *d* without the wheel, and secured as in Fig. 3. This form of Chuck is used for all the smaller pinions, either with or without their wheels, and for turning and finishing new ones, or pivoting old ones, facing pinions, and pivoting hollows; and when firmly secured by the cement, wheels may be fastened on their pinions by careful riveting, before they are taken from the Chuck.

Figure 5.

Fig. 5 shows the shape of the Chuck to be used for obtaining correct centres for a cylinder or balance staff, or any other piece where two centres are required. The Chuck is

to be heated by the lamp until it will melt the cement when applied to the end ; when a sufficient quantity is melted on the Chuck, the cylinder *c* is to be placed in the cement *D*, while warm ; the blaze of the lamp, as seen at *H*, is then carefully applied to the cement *D* and the collet *c* ; a piece of watch-wood *e* is to be placed at the end of the outer pivot of *c*, and the cylinder gently pressed into the cement until the inner pivot or centre is brought to its place, as shown in the figure. The Chuck *d* is then to be slowly turned, and the wood held against the outer pivot or centre, as seen at *e*. If required, the piece *e* may be placed on the Lathe-rest, that it may be more steadily held until the cement becomes hard.

For removing the cylinder or other small piece from the Chuck, the blaze of the lamp should be applied to the long pliers or tweezers while holding on to the piece.

In this manner all delicate parts of watches may be taken from the Chuck, without taking the cement with them.

Figure 6.

Fig. 6 shows the cylinder in the cement, as in Fig. 5, with reversed centres. The same method is employed for securing it in the Chuck, as that described in Fig. 5, except that it is centred from the body of the cylinder, as shown in the figure. In applying the lamp, care should be had at all times not to *burn the cement*, and an alcohol lamp should be used for heating and cementing every kind of work connected with the Lathe.

Figure 7.

Fig. 7 shows a verge, as cemented on the Chuck. A

piece of wood, cut into convenient shape, should be used, as shown in the figure; it should also be used for chucking every description of work; and in all cases the lamp is to be first applied to the Chuck, and the heat communicated from it to the cement, and as much as possible to the piece to be cemented.

Figure 8.

Fig. 8 shows a balance wheel pinion in the position to be turned and finished. When long pinions or delicate parts of watches are to be chucked, the cement should cover the piece, as shown in the figure, and afterwards be removed as the parts are wanted for turning and finishing.

Figure 9.

Fig. 9 shows a Chuck for repairing pivots to the barrel arbor when there is a square on each end. The Chuck is to be drilled, as shown in the figure, and a piece of brass fastened on the end with tin solder, and a hole turned in it to fit the plate or barrel-bar-pivot. The arbor may then be secured in the usual way, for any alteration that may be required.

Figure 10.

Fig. 10 shows the form of the Chuck to be used for cementing jewels and other pieces which are required to run true on the edge and face. A piece of wood is to be held against the face and edge of the jewel, as shown in the figure. The chuck is to be slowly turned, and the piece of wood held steadily on the Lathe-rest and against the jewel.

Figure 11.

Fig. 11 represents a boxwood Chuck secured to the brass Chuck *d*; and the hollow *e* in the wood is to be turned, as shown in the figure, and is used with crocus and oil for facing and finishing flat wheels on their pinions. The space *e* should be made large enough to give perfect freedom to the pinion, and the Chuck should have an alternate motion backward and forward.

Figure 12.

No. 1 represents a Chuck to be placed in the Lathe-mandril with a concave centre; Nos. 2 and 3 a Chuck as taken from the Lathe, to which is attached a wheel and pinion; No. 4 a hollow piece of fine brass or bell-metal, to be used for facing and finishing the leaves of pinions; the screw *h* is to be placed as represented in No. 1, and the pinion to have a backward and forward motion. When more friction is required between the concave Chuck and the screw *h*, it may be had by using a little emery and water on the parts.

Figure 13.

Fig. 13 is a Chuck with a drilled centre, as in Figs. 9 and 10, into which a piece of tempered steel wire is fastened by means of lead solder. When secured in this manner, it can be turned more safely and rapidly than when fastened by cement. In fitting the duplex staff after the part for the roller is turned to the size wanted, it should be covered with cement until the other parts are finished. The same kind

of Chuck can be used for chronometer rollers, duplex pallets, table rollers, hollow pinions, &c., by converting the steel centre piece into an arbor.

Figure 14.

Fig. 14 is a Chuck, the face of which should be turned concave, and drilled for a centre piece, as in Fig. 13. The centre piece, when fitted, should be tapered and driven in, and should be sufficiently large to allow any alteration that may be required to fit the hole in the piece to be turned. This kind of Chuck may be used for balances, barrels, maintaining springs, and all other circular pieces which are required to be turned true from their sides and centres.

Figure 15.

Fig. 15 shows the method of finishing the balance rim of a steel balance. A flat wheel, made of fine brass or copper, and running on two pivots, is used in the place of the one represented in Fig. 16. The balance is to be fastened on the Chuck, and the wheel *h* held on the balance rim, as seen in Fig. 15. The same kind of wheel may be used with oil-stone, if required.

Figure 16.

Fig. 16 is a wheel for finishing conical pivots. The edge of the wheel is placed under the pivot, as represented in Fig. 17, the straight part of the pivot resting on the flat part of the wheel; at the same time the edge of the wheel must fit the conical part of the pivot: the motion of the pivot will give motion to the wheel, and, with the use of fine crocus

and oil, conical pivots may be rapidly finished directly from the graver. A piece of watch-wood may be used for cleaning the pivot after using the wheel.

Figure 18.

Fig. 18 shows a brass or copper wheel made to run freely on two pivots, as represented in the figure, and is used for glossing hollows. The wheel must be turned an oval shape, and quite sharp at the edge, and its diameter must be three times that of the hollow to be finished. If needed, oil-stone dust may be first used, and then finished with fine glossing stuff and oil. If care is used in turning the hollow, oil-stone will not be necessary.

Figures 19, 20, 21 & 22.

Fig. 19 shows the kinds of wheels used for grinding and finishing flat surfaces of steel. H is the wheel to be fastened to the Lathe-mandril; *c* the wheel to which the pieces to be finished are cemented, and must be one half the diameter of the wheel H. The smaller wheel *c* should be held to its place on the larger one H by a short handle, on which a pivot is made to fit the centre hole of the smaller wheel, as shown in the figure.

Fig. 20 shows the smaller wheel *c*, with the pieces fastened by cement for grinding and finishing, and, when used, should be held on one side of the centre of the wheel H. The motion of the larger wheel H will be communicated to the smaller one *c*, and by this method steel surfaces can be rapidly and perfectly finished. Nos. 1 and 2, in Fig. 20, show the pieces as cemented in their places. When only one spring is to be finished, a piece of soft steel or iron, of

the same thickness as the spring, should be cemented on the wheel with it, as in No. 2. When screw heads are to be finished, holes should be made for the screws in the wheel *c*, Fig. 19. In this way a great number can be finished at the same time. If only one or two should be wanted, a piece must be used to level them, as has been shown in Fig. 20. When glossing steel pieces which are to be blued, the crocus should not be suffered to dry on the wheel, or the blue will not be perfect, no matter how finely the piece may be finished. A great variety of concave and convex pieces can be cut and finished in the manner already described.

For concave surfaces, the larger wheel must be convex, as in Fig. 21, and the smaller one concave; and the reverse must be the case, as shown in Fig. 22, when convex surfaces are to be finished.

Figure 23.

Fig. 23 shows a bolt, as cemented at *b*, so as to bring its face on the lower edge of the wheel *c*, only a section of which is shown in the figure. The lower end of *a* should be tapered to a point, and be of sufficient length to be placed in a rest secured to the bench, so that the piece *b* shall be parallel with the face of the wheel *c*; the face of the bolt or other circular piece is then to be brought against the face of the wheel *c*, and at the same time to have a circular motion between the thumb and fingers. For grinding and shaping the work, an iron or copper wheel should be used, and a tin wheel for glossing. By this method the faces of lever pallets, bolts, and a variety of circular springs and other pieces, may be finished.

Figure 24.

Fig. 24 shows a plate for making and finishing flat surfaces. Nos. 1 and 2 are the adjusting screws, which can be used to bring the surface of the piece to be finished to the position required on the wheel, either at *b* or *c*. The part is to be made flat with emery and water, and, after being thoroughly cleaned, may be glossed with crocus and oil on a tin wheel. The part finished should be covered with a solution of gum shellac and alcohol, which will protect it from injury while the other parts are being ground and finished. Should the workman wish to hasten the evaporation of the alcohol in the shellac, he can do so by holding it for a moment near the blaze of the lamp. By making holes through the plate, it may be used for finishing ends of fusee squares, canon pinions, flat screw heads, &c., &c.

Figure 25.

Fig. 25 shows a tin roller, which is used for frosting wheels and other parts of watches. It is first to be rolled on a piece of hard wood, thinly covered with dry flour of of emery, and then held against the wheel, and both wheel and roller turned together. When only parts of wheels are to be frosted, it should be done after other parts are finished. Fusee caps, dial, centre and main wheels, may be finished in the manner described, and should then be washed in alcohol with a fine brush, and dried in boxwood sawdust.

Figures 26 & 27.

Fig. 26 shows the graver and the piece to be turned. D is the graver, and A and S the line of direction in which

it is to be held to turn the piece *c*. When it cuts more deeply than is required, move the point towards A instead of *c*. If held as represented in the figure, the point cannot be easily broken, and the cutting edge will last much longer than when held in any other position.

When the ends of pinion leaves are to be turned, the graver must be placed on the under side of the pinion arbor, as shown in Fig. 27, with its cutting side against the face of the pinion. The edge is then to be steadily turned towards the face of the leaves until it comes in contact with them, and the cutting should be from towards the centre outwards, and the point so much inclined downwards as to cut two or more leaves at the same time.

If the above directions are strictly followed, the leaves of pinions and the teeth of wheels may be turned perfectly flat, and can be readily finished directly from the graver.

Figure 28.

Fig. 28 shows the form of the bench which should be used in fitting up the Lathe. The dimensions should be nearly as follows:

Length, - - - - - - -	3 feet 9 inches.
Width, - - - - - - -	1 " 11 "
Height, - - - - - - -	3 " 8 "

The distance between the cross pieces on which the wheel mandril is secured, should be about 10 inches from centre to centre. The spiral spring, which is designed to give steadiness of motion to the wheel, should be secured to the crank and the back upright piece, as shown in the figure. The foot-piece should be secured to the back rail by a hinge

and a small iron rod used to connect the foot-piece with the crank. It should be secured to the foot-piece by a staple, and to the crank by a hook on the end of the rod.

Pivots with Square Shoulders.

For finishing pivots with square shoulders, a straight slip of soft steel is first used. It should be beveled on the side to be used against the shoulder, to quite a thin edge, and placed on the under side of the pivot. The Lathe-rest should be drawn out as far as possible, and so adjusted that the slip, when placed on the pivot and against the rest, shall be in a line with the shoulder. The pivot should be slowly turned, and the slip have a short backward and forward motion. Oil-stone dust may be first used, if needed, and for glossing a slip of fine brass is preferred. The use of the eye-glass will be found of much service, especially in finishing small pivots, as it will enable the workman to hold the polishing piece more steadily on the pivot and against the shoulder.

Pivot Drills and New Pivots.

Drills, such as are used for new pivots, should be enclosed in an iron or copper *tube*, and hardened in oil. The drill point is then to be held in the pliers, and placed in the blaze of the lamp until it is blued nearly to the point. The drill is to be secured in a small handle or a soft piece of wood, and sharpened so as to cut only in one direction. It should be held in the hand, and the balance staff or other piece to be drilled, secured in the usual way in the Chuck, and the centre turned with the graver point. The staff may then

be drilled, and a piece of steel driven into the hole, and the pivot turned and finished without being removed from the Chuck. The larger drills may be cemented in Chucks drilled for the purpose, and the piece to be drilled should be placed between the drill, and a piece of wood held across the Lathe-rest.

For Removing Cement from the Work.

Parts of watches or other pieces should be held in a pair of tweezers or long pliers, and the lamp applied near their ends, so as to melt the cement on the piece; it may then be removed with a stiff brush, and the piece should afterwards be placed in alcohol warmed over the lamp, and the Lathe-brush used on it with fine crocus and oil.

Crocus and Oil.

In preparing crocus for glossing steel or brass, much care should be used, and no more oil added than will be sufficient to make it into a thick paste. It should be well broken and mixed, and kept in a close box free from dust. Watch oil is preferred for this purpose, as it does not dry so readily as other oils, and may be kept for months after being prepared in this way, without injury.

Solution for Tinning.

To one ounce of muriatic acid add half an ounce of zinc. It should be kept in a glass bottle with a ground glass stopper. When used, a very little should be taken from the bottle on the stopper, and touched to the steel, or iron, or other metal to be tinned; it can then be soldered with tin or lead solder.

Figs. 1, 2, 3 & 4.

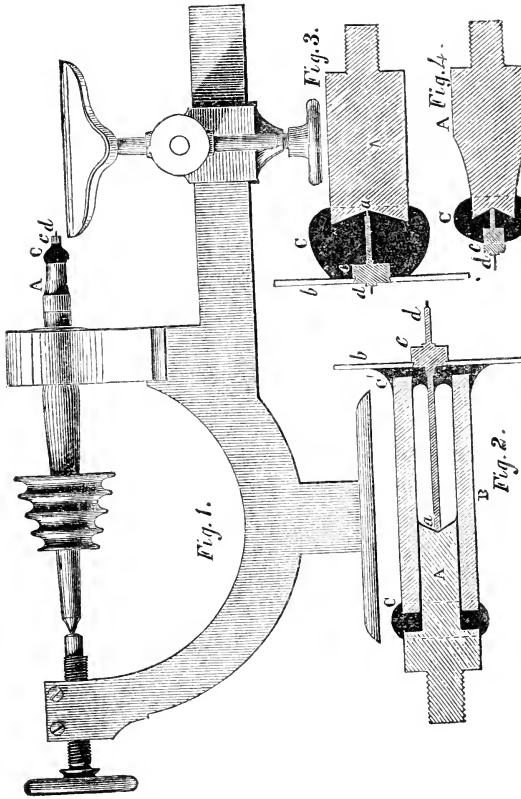


Fig. 5.

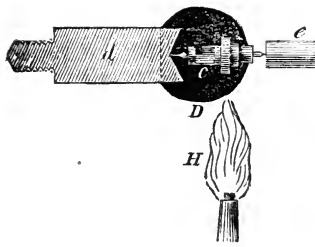
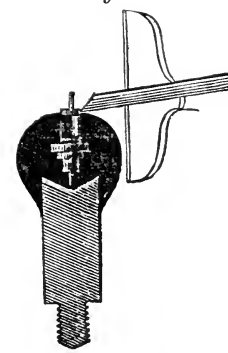


Fig. 6.



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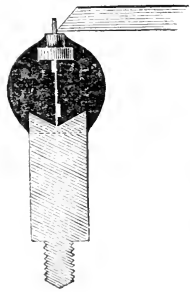
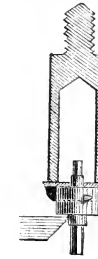


Fig. 8.

Fig. 9.



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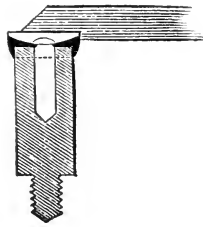

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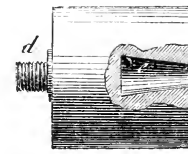

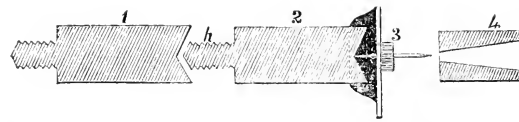

Fig. 12.

Fig. 13.

Fig. 14.

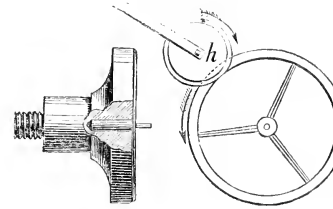

Fig. 18.

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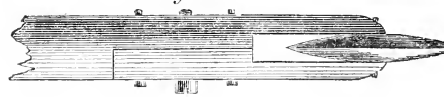


Fig. 17. *Fig.* 16.

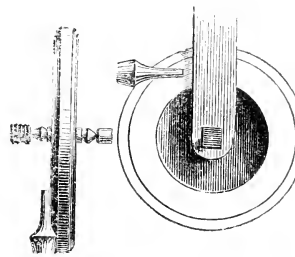
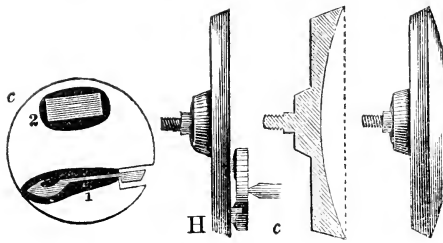


Fig. 20. *Fig.* 19.

Fig. 23.

Fig. 22. *Fig.* 21.



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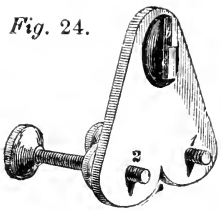

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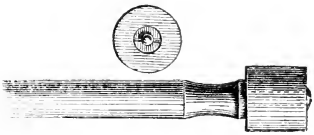


Fig. 26.

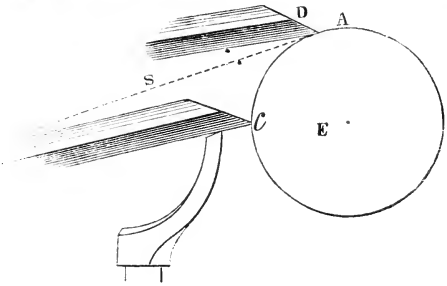
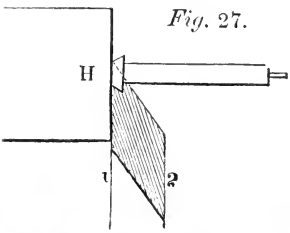


Fig. 27.



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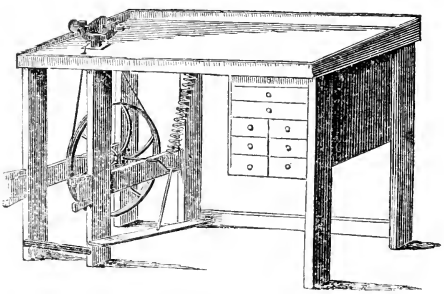

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